Oracle Quad 10 Gb or Dual 40 Gb Ethernet Adapter User's Guide

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Using This Documentation

- **Overview** – Provides specifications and describes how to install and administer the Oracle Quad 10 Gb or Dual 40 Gb Ethernet Adapter.
- **Audience** – Technicians, system administrators, and authorized service providers.
- **Required knowledge** – Advanced experience troubleshooting and replacing hardware.

In this document, the term “adapter” refers to the Oracle Quad 10 Gb or Dual 40 Gb Ethernet adapter, the term “x86” refers to 64-bit and 32-bit systems manufactured using processors compatible with the AMD64, Intel Xeon, or Intel Pentium product families, and the term “Oracle Solaris” refers to Oracle Solaris 11.3 SRU8.

Product Documentation Library

Documentation and resources for this product and related products are available at http://www.oracle.com/goto/quad10gb-dual40gb-ethernet-adapter/docs.

Feedback

Provide feedback about this documentation at http://www.oracle.com/goto/docfeedback.

Understanding the Installation Process

These topics provide an overview of the installation process for the adapter:

Related Information

Installation Task Overview (Oracle Solaris)

Step	Description	Links
1.	Understand the adapter.	“Understanding the Adapter” on page 15
2.	Confirm the adapter specifications and technical requirements.	“Physical Specifications” on page 19 “Electrical Specifications” on page 20 “Environmental Specifications” on page 20

Step	Description	Links
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Related Information

- "Installation Task Overview (Linux)" on page 12
- "Installation Task Overview (Windows)" on page 13

Installation Task Overview (Linux)

Step	Description	Links
1.	Understand the adapter.	"Understanding the Adapter" on page 15
2.	Confirm the adapter specifications and technical requirements.	"Physical Specifications" on page 19 "Electrical Specifications" on page 20 "Environmental Specifications" on page 20
3.	Determine if the driver is supported on your server and the driver is up to date.	"Hardware and Software Requirements" on page 21
4.	If your OS is out of date, update the entire OS image, or download and apply the latest OS patch.	"Updating Software and Firmware" on page 23
5.	Verify the driver installation.	"Download and Install the `i40e` Driver (Linux)" on page 30 "Download and Install the `i40evf` Driver (Linux)" on page 32
6.	Install the adapter and verify the installation.	"Installing the Adapter" on page 37

Step	Description	Links
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8.	Configure the driver parameters.	“Set Driver Parameters (Linux)” on page 64 “Driver Parameters (Linux)” on page 65
9.	(Optional) Configure jumbo frames.	“Configure Jumbo Frames (Linux)” on page 68
10.	(Optional) Configure VLANs.	“VLANs Overview” on page 75 “Configure VLANs (Linux)” on page 77
11.	If desired, remove a driver.	“Remove the `i40e` Driver (Linux)” on page 82 “Remove the `i40e` Driver (Linux)” on page 82

Related Information

- “Installation Task Overview (Oracle Solaris)” on page 11
- “Installation Task Overview (Windows)” on page 13

Installation Task Overview (Windows)

Step	Description	Links
1.	Understand the adapter.	“Understanding the Adapter” on page 15
2.	Confirm the adapter specifications and technical requirements.	“Physical Specifications” on page 19 “Electrical Specifications” on page 20 “Environmental Specifications” on page 20
3.	Determine if the driver is supported on your server and the driver is up to date.	“Hardware and Software Requirements” on page 21
4.	If your OS is out of date, update the entire OS image, or download and apply the latest OS patch.	“Updating Software and Firmware” on page 23
5.	Verify the driver installation.	“Download and Install the `i40e` Driver (Windows)” on page 34 “Download and Install the `i40evf` Driver (Windows)” on page 34
6.	Install the adapter and verify the installation.	“Installing the Adapter” on page 37
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Related Information

- “Installation Task Overview (Oracle Solaris)” on page 11
- “Installation Task Overview (Linux)” on page 12

Understanding the Adapter

These topics provide an overview of the adapter.

Related Information

- "Understanding the Installation Process" on page 11
- "Confirming Specifications and Requirements" on page 19
- "Updating Software and Firmware" on page 23
- "Installing the Driver" on page 27
- "Installing the Adapter" on page 37
- "Configuring the Network" on page 53
- "Configuring Driver Parameters" on page 61
- "Configuring Jumbo Frames" on page 67
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- "Configuring VLANs and VXLANs" on page 75
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- "Troubleshooting the Adapter (Oracle Solaris)" on page 85

Shipping Kit Contents

The carton in which the adapter was shipped should contain the following items:

- Adapter with a low-profile bracket attached
- Standard height bracket, screws, and washer
- *Oracle Quad 10Gb or Dual 40Gb Ethernet Adapter Where To Find Documentation*

Related Information

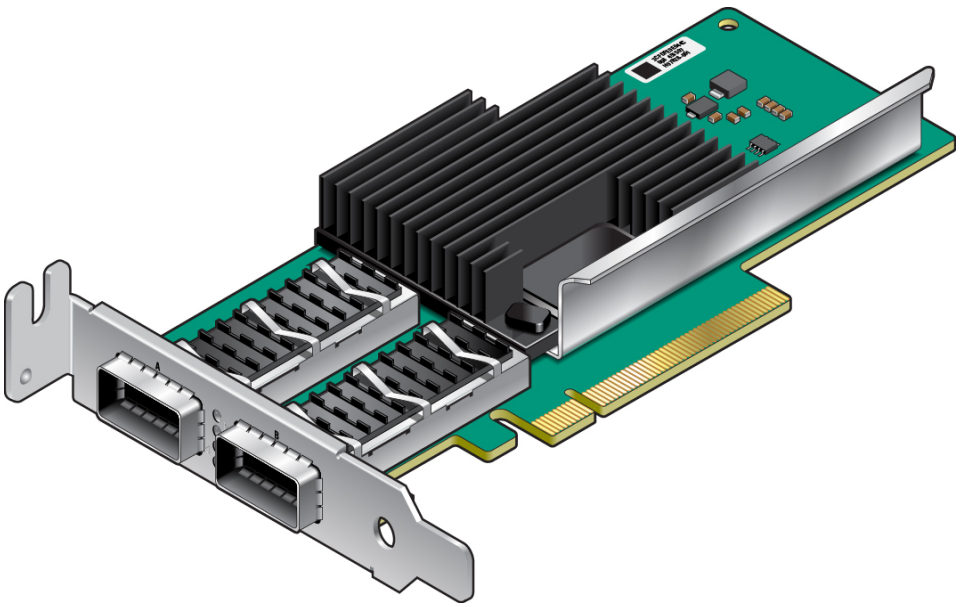
- "Adapter Overview" on page 16

- “Front Panel Connectors and LEDs” on page 17

Adapter Overview

The adapter is Oracle's QSFP+ PCIe 3.0 x8 low-profile networking card. This adapter has two QSFP+ connector ports, port 0 (A) and port 1 (B). The adapter is ideal for slot-constrained servers, providing a simplified low-cost alternative to multiple 10GbE server adapters.

Feature	Specification
Data rate supported per port	■ 2x40GbE QSFP+ mode provides up to a max of 80Gbps bandwidth over two ports. It is limited by PCIe x8 transfer rates. ■ 4x10GbE with breakout cables provides 10Gbps per port. Only Port 0 (A) can be configured. ■ 2x2x10GbE where each port is split into two physical functions that operate at 10Gbps
Bus type	PCIe V3.0, 8.0 GTps
Bus width	x8, x4, x1 lane PCIe
Conforms to Ethernet standard	802.1
Boot ROM	4 Mb SPI Flash
EMI	FCC Class A



Related Information

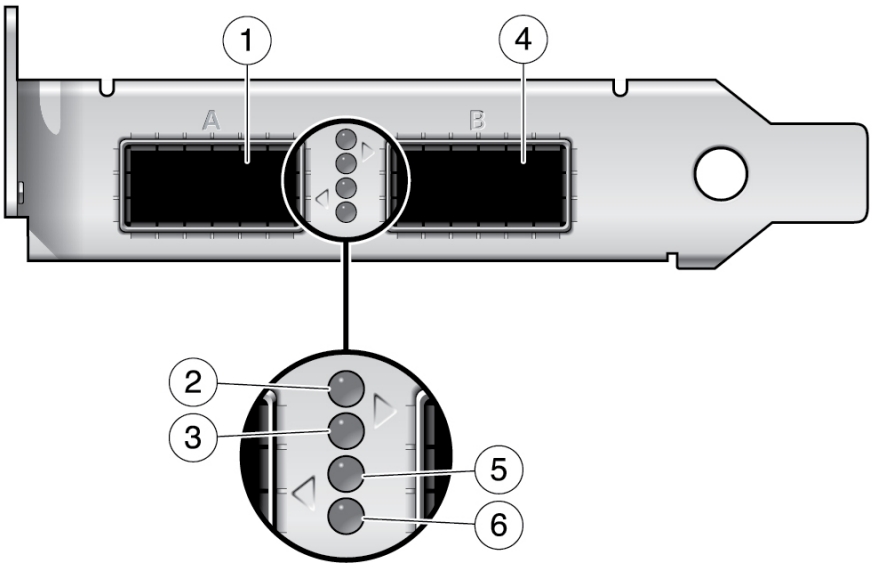
- “Shipping Kit Contents” on page 15
- “Front Panel Connectors and LEDs” on page 17

Front Panel Connectors and LEDs

On the front panel between the two ports, four LEDs signal the port speed, state, and activity. This figure and this table explains the meaning of the LEDs for port 0 (A) and port 1 (B). Port 0 accepts a QSFP+ optical transceiver, which can be purchased separately or included with your adapter.

For the 4x10GbE mode, only port 0(A) can be configured. If you use a splitter cable, port 0 can act as four ports. If a splitter cable that has four cables on the other end is used, and if all four splitter cables are connected to SFP+ ports of a client, then all four LEDs will be green. If there is activity on all four ports, then all four LEDs will blink. If any of the four cables are not connected, then the corresponding LED will be off. The Splitter cable has label 1, 2, 3, 4 (fiber splitter) or a, b, c, d (copper splitter) corresponding to port LED callout numbers 2, 3, 5, and 6.

For the 2x2x10GbE mode, both port 0 (A) and port 1 (B) are active. LED callout numbers 2 and 3 correspond to port 0 (A). LED callout numbers 5 and 6 correspond to port 1 (B).



No.	Description	2x40GbE Mode	4x10GbE Mode	2x2x10GbE Mode
1	Port 0 (A)			
2	LED 1	Blink on with activity to port 1 (B)	Blink On with Activity on any lane	Blink On with Activity on any lane
3	LED 2	Green with 40GbE link	Green with 10GbE link on all lanes	Green with 10GbE link on all lanes
4	Port 1 (B)			
5	LED 3	Blink on with activity to port 0 (A)		Blink On with Activity on any lane
6	LED 4	Green with 40GbE Link		Green with 10GbE Link

Note - With 4x10GbE, the LED corresponding to the connected cable is green and that LED blinks with activity on that port.

Related Information

- “Shipping Kit Contents” on page 15
- “Adapter Overview” on page 16

Confirming Specifications and Requirements

These topics provide technical information and airflow precautions you need to understand before installing the adapter.

Related Information

- “Understanding the Installation Process” on page 11
- “Understanding the Adapter” on page 15
- “Updating Software and Firmware” on page 23
- “Installing the Driver” on page 27
- “Installing the Adapter” on page 37
- “Configuring the Network” on page 53
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Physical Specifications

Description	U.S.	Metric
Length	6.80 in.	172.72 mm
Height	3.116 in.	79.15 mm
Weight	0.287 lbs	0.130 kg

Related Information

- “Electrical Specifications” on page 20
- “Environmental Specifications” on page 20
- “Hardware and Software Requirements” on page 21

Electrical Specifications

Description	Value
Max power consumption	5.1W at 12V
Typical active power	3.49W at 4x10Gbe mode 3.82W at 2x40Gbe mode estimated 3.75W at 2x2x10Gbe mode
Supply voltage	12V ± 15%

Related Information

- “Physical Specifications” on page 19
- “Environmental Specifications” on page 20
- “Hardware and Software Requirements” on page 21

Environmental Specifications

Specification	Operation	Storage
Temperature[†]	-5°C to 55°C (-5°C to 131°F), noncondensing	-40°C to 70°C (-40°F to 158°F), noncondensing
Humidity	10% to 90% noncondensing relative humidity at 27°C (80.6°F) maximum wet bulb	93% noncondensing relative humidity at 38°C (100.4°F) maximum wet bulb
Altitude	1,829 meters (6,000 feet) at 45°C (113°F) ambient 1,219 meters (4,000 feet) at 35°C (95°F) ambient	12,000 meters (39,370.1 feet)
Vibration	0.20 G in all axes (20-500 Hz sine)	1.0 G in all axes (20-500 Hz sine)
Shock	1.75g, 32 seconds (VERTEQII -Zone 4 waveform) 40 m/s2 22 ms shock type L	100 m/s2 (11 ms half-sine)

Specification	Operation	Storage
Airflow	150 LFM at 55°C (131°F) local ambient temperature	

†Temperature listed is for the server that the card is installed in. The actual internal ambient inside the server local to the card might be higher.

Related Information

- “Physical Specifications” on page 19
- “Electrical Specifications” on page 20
- “Hardware and Software Requirements” on page 21

Hardware and Software Requirements

Hardware and software support changes over time. For the latest information concerning I/O options supported by your server, check:

`http://www.oracle.com/us/products/networking/overview/index.html`

For the latest list of supported platforms and operating systems, refer to the *Oracle Quad 10 Gb or Dual 40 Gb Ethernet Adapter Product Notes* at:

`http://www.oracle.com/goto/quad10gb-dual40gb-ethernet-adapter/docs`.

For Oracle Solaris OS systems, the minimum supported version is required, which is Oracle Solaris 11.3 SRU8.

Related Information

- “Physical Specifications” on page 19
- “Electrical Specifications” on page 20
- “Environmental Specifications” on page 20

Updating Software and Firmware

These topics provide information on updating the adapter software and firmware.

Related Information

- "Understanding the Installation Process" on page 11
- "Understanding the Adapter" on page 15
- "Confirming Specifications and Requirements" on page 19
- "Installing the Driver" on page 27
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▼ Update the OS (Oracle Solaris)

For the latest list of supported platforms and operating systems, see "Hardware and Software Requirements" on page 21.

For Solaris OS systems, the minimum supported version is required, which is Oracle Solaris 11.3 SRU8.

1. **Update the entire OS image on the client server.**
2. **Ensure that Oracle Solaris 11.3 SRU8 is installed.**

For more information, refer to My Oracle Support at: https://support.oracle.com

For additional information, check the product web page at:

http://www.oracle.com/goto/10gb-or-40gb-ethernet-adapter

Related Information

- “Firmware Update Tool Overview” on page 24
- “Use the QCU Tool For Port Mode Configuration” on page 24

Firmware Update Tool Overview

You can update the firmware using the firmware update tool, which can be obtained in these ways for the Oracle Solaris, Linux and Windows environment:

- Oracle System Assistant (OSA), a built-in tool on x86 servers or a USB thumb drive shipped with the server, which contains the firmware update tool. Refer to the text files in OSA for instructions on updating your firmware.
- Hardware Management Pack (HMP), which includes the firmware update tool. Refer to the text files in HMP for instructions on updating your firmware.
- `fwupdate` Automatic Mode Command Syntax. For more information on this command, refer to http://docs.oracle.com/cd/E52095_01/index.html.

Related Information

- “Update the OS (Oracle Solaris)” on page 23
- “Use the QCU Tool For Port Mode Configuration” on page 24

Use the QCU Tool For Port Mode Configuration

After you update your firmware, determine which configuration mode you want to be in, using the QCU tool. The QCU tool is a command-line utility used for dynamically switching the ports between various modes supported by the adapter.

- 4x10 mode, whereby a port is split into four physical functions that operate at 10Gbps. Port 1 (B) is not active in this configuration.
- 2x40 mode, whereby both ports are configured to operate at 40Gbps. Both ports appear as single physical functions.

- 2x2x10 mode, whereby each port is split into two physical functions that operate at 10Gbps.

Note - All prerequisites must be completed before changing modes.

To switch port modes, refer to the QCU tool instructions, which can be downloaded from:http://www.oracle.com/goto/10gb-or-40gb-ethernet-adapter, under Related Products.

Related Information

- “Update the OS (Oracle Solaris)” on page 23
- “Firmware Update Tool Overview” on page 24

Installing the Driver

These topics describe how to install the driver on all server types.

Description	Links
Verify the driver on an Oracle Solaris platform.	“Verify the `i40e` Driver (Oracle Solaris)” on page 27 “Verify the `i40evf` Driver (Oracle Solaris)” on page 29
Download and install the driver on a Linux platform.	“Download and Install the `i40e` Driver (Linux)” on page 30 “Download and Install the `i40evf` Driver (Linux)” on page 32
Download and install the driver on a Windows platform.	“Download and Install the `i40e` Driver (Windows)” on page 34 “Download and Install the `i40evf` Driver (Windows)” on page 34

Related Information

- “Understanding the Installation Process” on page 11
- “Understanding the Adapter” on page 15
- “Confirming Specifications and Requirements” on page 19
- “Updating Software and Firmware” on page 23
- “Installing the Adapter” on page 37
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- “Troubleshooting the Adapter (Oracle Solaris)” on page 85

▼ Verify the `i40e` Driver (Oracle Solaris)

The `i40e` and `i40evf` software package comes bundled in the Oracle Solaris software. Two device drivers are available for this adapter:

- i40e - Physical function (PF) driver
- i40evf - Virtual function (VF) driver

Note - Oracle Solaris 11.3 SRU8 OS is the first release to support this adapter. You can upgrade to or install this release, but the version of the driver must be the same on both the client and the server.

---

1. **Check the version of the installed driver.**

```
# strings /kernel/drv/$(isainfo -n)/i40e | grep i40e
...
i40e 1.0.14
```

If the version number is not at least 1.0.14, you must install the latest driver, or you can reinstall the OS.
See "Hardware and Software Requirements" on page 21 for more information.

Note - If the i40e(7D) driver is not listed, the driver might not be loaded. You can use the modload(1M) command to load the driver if needed.

---

2. **Manually load the driver.**

```
# modload /kernel/drv/arch/i40e
```

where *arch* is amd64 for 64-bit Intel server or sparcv9 for Oracle SPARC servers.

3. **If you removed the driver and would like to reinstall the driver, install the i40e package.**

Note - Before installing the package, ensure that your publishers are pointing to the correct repository.

```
# pkg install i40e
# ls -l /kernel/drv/$(isainfo -n)/i40e
-rwxr-xr-x 1 root sys 350616 Apr 16 15:23 /kernel/drv/sparcv9/i40e
```

or

```
# ls -l /kernel/drv/$(isainfo -n)/i40e
-rwxr-xr-x 1 root sys 384920 Apr 16 18:48 /kernel/drv/amd64/i40e
# add_drv -i '"pciex8086,154b" "pciex8086,1572" "pciex8086,1573" "pciex8086,1574"
 "pciex8086,157f" "pciex8086,1580" "pciex8086,1581" "pciex8086,1582" "pciex8086,1583"
 "pciex8086,1584" "pciex8086,1585"' i40e
```

where *pciex8086,1572 pciex8086,1573 pciex8086,157f* list the PCIe drivers.

Related Information

- "Verify the i40evf Driver (Oracle Solaris)" on page 29
- "Download and Install the i40e Driver (Linux)" on page 30
- "Download and Install the i40evf Driver (Linux)" on page 32
- "Download and Install the i40e Driver (Windows)" on page 34
- "Download and Install the i40evf Driver (Windows)" on page 34

▼ Verify the i40evf Driver (Oracle Solaris)

The i40e and i40evf software package comes bundled in the Oracle Solaris software. Two device drivers are available for this adapter:

- i40e - Physical function (PF) driver
- i40evf - Virtual function (VF) driver

Note - The Oracle Solaris 11.3 SRU8 OS is the first release to support this adapter. You can upgrade to or install this release, but the version of the driver must be the same on both the client and the server.

---

1. **Check the version of the installed driver.**

```
# strings /kernel/drv/$(isainfo -n)/ i40evf | grep i40evf
...
i40evf 1.0.12
```

If the version number is not at least 1.0.12, you must install the latest driver, or you can reinstall the OS.

See "Hardware and Software Requirements" on page 21 for more information.

2. **Manually load the driver.**

```
# modload /kernel/drv/arch/i40evf
```

If the i40evf is not installed, do so now.

```
# add_drv -i '"pciex8086,154c" "pciex8086,1571"' i40evf
```

Note - If the i40evf driver is not listed, the driver might not be loaded. You can use the modload(1M) command to load the driver if needed.

```
# modload /kernel/drv/arch/i40evf
```

where *arch* is amd64 for 64-bit Intel servers or sparcv9 for Oracle SPARC servers.

Related Information

- "Verify the i40e Driver (Oracle Solaris)" on page 27
- "Download and Install the i40e Driver (Linux)" on page 30
- "Download and Install the i40evf Driver (Linux)" on page 32
- "Download and Install the i40e Driver (Windows)" on page 34
- "Download and Install the i40evf Driver (Windows)" on page 34

▼ Download and Install the i40e Driver (Linux)

If your server uses the Red Hat or SUSE Linux OS, you must download the i40e device driver to install it.

1. **Log in to your server.**
2. **In a browser, go to:**
   http://downloadcenter.intel.com/download/24411
3. **Select Downloads and Drivers.**
4. **Select Linux as the OS.**
5. **Select this driver:**
   Network Adapter Virtual Function Driver for 40 Gigabit Network Connections.
6. **Select Download.**
   The download begins. The file named i40e-*x.x.xx*.tar.gz is saved in the ~/Desktop directory of your server.

Note - The primary driver link is a buildable source archive that works with Linux 2.6.*x* kernels only, and requires that the currently running kernel match the SRC RPM kernel files and headers in order to build the driver. Refer to the bundled README file in the unpacked archive from Intel for more information.

For this example, assume that the file is named i40e-1.2.3.4.tar.gz. The actual file might have different version or subversion numbers.

7. **Review and accept the software license agreement.**

8. **Copy the file containing the driver from ~/Desktop to /temp.**

9. **Uncompress and untar the file.**

```
# tar -zxvf i40e-1.2.3.4.tar.gz
```

10. **Go to the newly created src directory.**

```
# cd /temp/i40e-1.2.3.4/src
```

11. **Compile the driver source file.**

```
# make
# make install
```

12. **Load the i40e(7D) driver.**

```
# modprobe i40e
```

13. **Verify that the i40e(7D) driver has been installed.**

```
# lsmod | grep i40e
```

The output should be similar to this:

```
i40e          118052  0
```

14. **Check the i40e driver version.**

```
# modinfo i40e | grep ver
```

For example, the output might be similar to this:

```
filename:       /lib/modules/2.6.18-53.el5/kernel/drivers/net/i40e/i40e.ko
version:        1.2.3.4ro
description:    Intel(R) Gigabit PCI Express Network Driver
srcversion:     5CFF6AEBA251050F8A4B746
vermagic:       2.6.18-53.el5 SMP mod_unload gcc-4.1
```

Related Information

- "Verify the i40e Driver (Oracle Solaris)" on page 27
- "Verify the i40evf Driver (Oracle Solaris)" on page 29
- "Download and Install the i40evf Driver (Linux)" on page 32
- "Download and Install the i40e Driver (Windows)" on page 34
- "Download and Install the i40evf Driver (Windows)" on page 34

▼ Download and Install the i40evf Driver (Linux)

If your server uses the Red Hat or SUSE Linux operating system, you must download the i40evf device driver to install it.

1. **Log in to your server.**
2. **In a browser, go to:**

   http://downloadcenter.intel.com/download/24693
3. **Select Downloads and Drives.**
4. **Select Linux as the OS.**
5. **Select this driver:**

   Network Adapter Virtual Function Driver for 40 Gigabit Network Connections.
6. **Select Download.**

   The download begins. The file named i40evf-*x.x.xx*.tar.gz is saved in the ~/Desktop directory of your server.

   Note - The primary driver link is a buildable source archive that works with Linux 2.6.*x* kernels only and requires that the currently running kernel match the SRC RPM kernel files and headers in order to build the driver. See the bundled README file in the unpacked archive from Intel for more information.

   For this example, assume that the file is named i40evf-1.2.3.4.tar.gz. The actual file might have different version or subversion numbers.
7. **Review and accept the software license agreement.**
8. **Copy the file containing the driver from ~/Desktop to /temp.**
9. **Uncompress and untar the file.**

```
# tar -zxvf i40evf-1.2.3.4.tar.gz
```

10. **Go to the newly created `src` directory.**

```
# cd /temp/i40evf-1.2.3.4/src
```

11. **Compile the driver source file.**

```
# make
# make install
```

12. **Load the `i40evf` driver.**

```
# modprobe i40evf
```

13. **Verify that the `i40evf` driver has been installed.**

```
# lsmod | grep i40evf
```

The output should be similar to this:

```
i40evf          118052  0
```

14. **Check the `i40evf` driver version.**

```
# modinfo i40evf | grep ver
```

For example, the output might be similar to this:

```
filename:       /lib/modules/2.6.18-53.el5/kernel/drivers/net/i40evf/i40evf.ko
version:        1.2.3.4ro
description:    Intel(R) Gigabit PCI Express Network Driver
srcversion:     5CFF6AEBA251050F8A4B746
vermagic:       2.6.18-53.el5 SMP mod_unload gcc-4.1
```

Related Information

- “Verify the i40e Driver (Oracle Solaris)” on page 27
- “Verify the i40evf Driver (Oracle Solaris)” on page 29
- “Download and Install the i40e Driver (Linux)” on page 30
- “Download and Install the i40e Driver (Windows)” on page 34
- “Download and Install the i40evf Driver (Windows)” on page 34

Download and Install the i40e Driver (Windows)

If the server uses the Windows Server 2003 or 2008 OS, perform the following procedure to download and install the device driver.

1. **Log in to the server.**
2. **In a browser, go to:**

   http://www.intel.com/p/en_US/support/highlights/network/ecna-x540-t2
3. **Select Downloads and Drives.**
4. **Select Windows Server 2012 or 2012R2 Standard x64 as the OS.**
5. **Select the latest driver.**
6. **Click the Download button next to the appropriate file for your server.**
7. **Review and accept the software license agreement.**
8. **Click on the .exe files to install the driver.**
9. **Follow the instructions in the installation wizard.**
10. **If the Found New Hardware Wizard screen is displayed, click Cancel.**

    The autorun utility automatically runs after you have extracted the files.

Related Information

- “Verify the i40e Driver (Oracle Solaris)” on page 27
- “Verify the i40evf Driver (Oracle Solaris)” on page 29
- “Download and Install the i40e Driver (Linux)” on page 30
- “Download and Install the i40evf Driver (Linux)” on page 32
- “Download and Install the i40evf Driver (Windows)” on page 34

Download and Install the i40evf Driver (Windows)

If the server uses the Windows Server 2003 or 2008 OS, perform the following procedure to download and install the device driver.

1. **Log in to the server.**

2. **In a browser, go to:**

   http://www.intel.com/p/en_US/support/highlights/network/ecna-x540-t2

3. **Select Downloads and Drives.**
4. **Select Windows Server 2012 or 2012R2 Standard x64 as the OS.**
5. **Select the latest driver.**
6. **Click the Download button next to the appropriate file for your system.**
7. **Review and accept the software license agreement.**
8. **Click on the .exe files to install the driver.**
9. **Follow the instructions in the installation wizard.**
10. **If the Found New Hardware Wizard screen is displayed, click Cancel.**

    The autorun utility automatically runs after you have extracted the files.

Related Information

- “Verify the i40e Driver (Oracle Solaris)” on page 27
- “Verify the i40evf Driver (Oracle Solaris)” on page 29
- “Download and Install the i40e Driver (Linux)” on page 30
- “Download and Install the i40evf Driver (Linux)” on page 32
- “Download and Install the i40e Driver (Windows)” on page 34

Installing the Adapter

These topics describe how to install the adapter.

Description	Links
If necessary, order additional hardware.	“Order Additional Hardware” on page 38 “Cable and Transceiver Descriptions” on page 39
Follow cable cautions.	“Cable Cautions” on page 42
Understand the connectors.	“Front Panel Connectors and LEDs” on page 17
Install the adapter.	“Install the Adapter” on page 43
Verify the adapter installation.	“Verify the Adapter Installation (Oracle SPARC)” on page 47 “Verify the Adapter Installation (Oracle Solaris x86)” on page 49 “Verify the Adapter Installation (Linux)” on page 50 “Verify the Adapter Installation (Windows)” on page 50

Related Information

- “Understanding the Installation Process” on page 11
- “Understanding the Adapter” on page 15
- “Confirming Specifications and Requirements” on page 19
- “Updating Software and Firmware” on page 23
- “Installing the Driver” on page 27
- “Configuring the Network” on page 53
- “Configuring Driver Parameters” on page 61
- “Configuring Jumbo Frames” on page 67
- “Configuring a Link Aggregation” on page 71
- “Configuring VLANs and VXLANs” on page 75
- “Removing the Driver” on page 81
- “Troubleshooting the Adapter (Oracle Solaris)” on page 85

▼ Order Additional Hardware

- **Ensure that you have the appropriate cables.**
  See “Cable and Transceiver Overview” on page 38 and “Cable and Transceiver Descriptions” on page 39.

Related Information

- “Cable and Transceiver Overview” on page 38
- “Cable and Transceiver Descriptions” on page 39
- “Cable Cautions” on page 42
- “Install the Adapter” on page 43
- “Install the QSFP+ Transceivers” on page 45
- “Verify the Adapter Installation (Oracle SPARC)” on page 47
- “Verify the Adapter Installation (Oracle Solaris x86)” on page 49
- “Verify the Adapter Installation (Linux)” on page 50
- “Verify the Adapter Installation (Windows)” on page 50

Cable and Transceiver Overview

The Oracle Quad 10Gb or Dual 40Gb Ethernet adapter comes with a factory default port mode of 4x10GbE, with only QSFP port 0 (A) enabled. This adapter supports two cabling option solutions: copper and optical.

Check the adapter product web page for available transceivers and cables at:

`http://www.oracle.com/goto/10gb-or-40gb-ethernet-adapter`.

- Copper:
  - The copper solution does not require QSFP transceivers.
  - A QSFP to QSFP direct-attach passive copper cable is available in 1, 2, 3, or 5 meters. One end of the QSFP cable connects to the QSFP port on the adapter, while the other end connects to the QSFP port on the switch or other device that is configured for 10GbE speed.

Note - When using QSFP to QSFP cables to connect the adapter to a 40GbE switch, ensure that the QSFP ports on the switch are configured in the 10GbE mode. Refer to the switch documentation for any special configurations for the QSFP port to work in the 10GbE mode.

- A QSFP copper splitter cable is available in 1, 3, or 5 meters. The QSFP end of the cable connects to the adapter's top QSFP port, while the four pigtails connect to four different 10G SFP+ ports on the switch or other device.

- Optical:
  - A QSFP SR transceiver connects to the adapter's QSFP port and the QSFP MPO to MPO optical cable, which is available in 5, 10, 20, 50, or 100 meters. One end of the QSFP optical cable connects to the QSFP transceiver on the adapter, while the other end connects to a QSFP transceiver in a switch or other device that is configured for 10GbE speed.
  - A QSFP SR transceiver connects to the adapter's top QSFP port and the QSFP optical splitter cable, which is available in 10, 20, or 50 meters. The QSFP end of the splitter cable connects to the QSFP transceiver on the adapter, while the four pigtails connect to four different 10GbE SFP+ transceivers on the switch or other device.

Related Information

- "Order Additional Hardware" on page 38
- "Cable and Transceiver Descriptions" on page 39
- "Cable Cautions" on page 42
- "Install the Adapter" on page 43
- "Install the QSFP+ Transceivers" on page 45
- "Verify the Adapter Installation (Oracle SPARC)" on page 47
- "Verify the Adapter Installation (Oracle Solaris x86)" on page 49
- "Verify the Adapter Installation (Linux)" on page 50
- "Verify the Adapter Installation (Windows)" on page 50

Cable and Transceiver Descriptions

4x10GbE Mode	Description/Part Number
Transceiver options (One transceiver required.)	■ QSFP parallel fiber optics short range transceiver ■ 2124A, Factory installed ■ X2124A-N, Xoption ■ QSFP+ parallel fiber optics long range transceiver ■ 71140598, Factory installed ■ 7114094, Xoption
Copper cable (direct attach) options	■ QSFP to 4 SFP+ copper splitter cable: 1 meter ■ 7110600, factory installation

4x10GbE Mode	Description/Part Number
(One cable required. No transceiver required.)	■ X2125A-1M-N, Xoption ■ QSFP to 4 SFP+ copper splitter cable: 3 meters ■ 7110601, factory installation ■ X2125A-3M-N, Xoption ■ QSFP to 4 SFP+ copper splitter cable: 5 meters ■ 7110602, factory installation ■ X2125A-5M-N, Xoption
Optical splitter cable length options (One cable required.)	■ MPO to 4 LC optical splitter cable: 10 meters ■ 7110603, factory installation ■ X2127A-10M-N, Multimode, Xoption ■ MPO to 4 LC optical splitter cable: 20 meters ■ 7110604, factory installation ■ X2127A-20M-N, Multimode, Xoption ■ MPO to 4 LC optical splitter cable: 50 meters ■ 7110605, factory installation ■ X2127A-50M-N, Multimode, Xoption

2x40GbE Mode	Description/Part Number
Transceiver options (Two transceivers required.)	■ QSFP parallel fiber optics short range transceiver ■ 2124A, Factory installed ■ X2124A-N, Xoption ■ QSFP+ parallel fiber optics long range transceiver ■ 71140598, Factory installed ■ 7114094, Xoption
Copper cable (direct attach) options (No transceiver required. Two cables required.)	■ QSFP to QSFP passive copper cable: 1 meter ■ 7105169, Factory installation ■ X2121A-1M-N, Xoption ■ QSFP to QSFP copper cable, 2 meter ■ 7105172, Factory installation ■ X2121A-2M, Xoption ■ QSFP to QSFP copper cable, 3 meter ■ 7105174, Factory installation ■ X2121A-3M-N, Xoption ■ QSFP to QSFP copper cable, 5 meter ■ 7105177, Factory installation ■ X2121A-5M-N, Xoption
Optical splitter cable length options (Two cables required.)	■ High bandwidth QSFP optical cable: 5 meters, MPO to MPO ■ 7105181, Factory installation ■ 7105199, Xoption ■ High bandwidth QSFP optical cable: 10 meters, MPO to MPO ■ 7105182, Factory installation ■ 7102869, Xoption

2x40GbE Mode	Description/Part Number
	■ High bandwidth QSFP optical cable: 20 meters, MPO to MPO ■ 7105186, Factory installation ■ 7102870, Xoption ■ High bandwidth QSFP optical cable: 50 meters, MPO to MPO (for factory installation)/ ■ 7105191, Factory installation ■ 7102871, Xoption ■ High bandwidth QSFP optical cable: 100 meters, MPO to MPO ■ 7105193, Factory installation ■ 7105206, Xoption

2x2x10GbE Mode	Description/Part Number
Transceiver options (Two transceivers required.)	■ QSFP parallel fiber optics short range transceiver ■ 2124A, Factory installed ■ X2124A-N, Xoption ■ QSFP+ parallel fiber optics long range transceiver ■ 71140598, Factory installed ■ 7114094, Xoption
Cable length options (Two cables required.)	■ Optical cable splitter: 10 meters, MPO/MTP to 2 LC on ports 3 and 4 OM3 ■ 7114366, Factory installed ■ 7114369, Xoption ■ Optical cable splitter: 20 meters, MPO/MTP to 2 LC on ports 3 and 4 OM3 ■ 7114367, Factory installed ■ 7114370, Xoption ■ Optical cable splitter: 50 meters, MPO/MTP to 2 LC on ports 3 and 4 OM3 ■ 7114368, Factory installed ■ 7114371, Xoption

Note - When using QSFP to QSFP cables to connect the adapter to a 40GbE switch, ensure that the QSFP ports on the switch are configured in the 10GbE mode. Refer to the switch documentation for any special configurations for the QSFP port to work in the 10GbE mode.

TABLE 1 Connector and Cable Support For the Different Modes

Connector	Optical/Fibre Cable Support		Direct-Attach Copper Cable Support
	Dual 40GbE mode	2x2x10GbE mode	4x10GbE mode
Port 0 (A)	2x40GbE	2x10GbE	4x10GbE
Port 1 (B)	2x40GbE	2x10GbE	

Note - In the 2x2x10GbE mode, direct-attach copper cables are not supported.

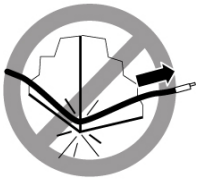
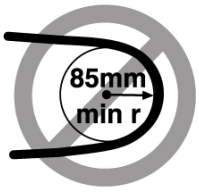
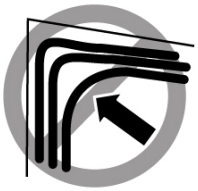
Note - For the 2x2x10GbE mode, use a Custom 2-way splitter cable which utilizes port C and D of the MPO/MTP connector. For all other modes, standard industry cables are supported.

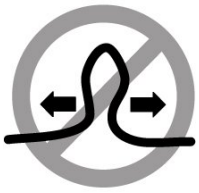
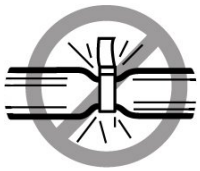
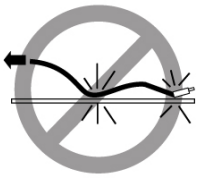
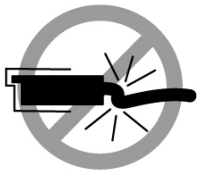
Related Information

- "Order Additional Hardware" on page 38
- "Cable and Transceiver Overview" on page 38
- "Cable Cautions" on page 42
- "Install the Adapter" on page 43
- "Install the QSFP+ Transceivers" on page 45
- "Verify the Adapter Installation (Oracle SPARC)" on page 47
- "Verify the Adapter Installation (Oracle Solaris x86)" on page 49
- "Verify the Adapter Installation (Linux)" on page 50
- "Verify the Adapter Installation (Windows)" on page 50

Cable Cautions

To prevent data cable damage, you must follow these cautions.

	Do not uncoil the cable, as a kink might occur. Hold the coil closed as you unroll the cable, pausing to allow the cable to relax as it is unrolled.		Do not step on the cable or connectors. Plan cable paths away from foot traffic or rolling loads.
	Do not pull the cable out of the shipping box, through any opening, or around any corners. Unroll the cable as you lay it down and move it through turns.		Do not bend the cables to a radius tighter than 85 mm (3.4 inches). Ensure that cable turns are as wide as possible.
	Do not twist the cable to open a kink. If it is not severe, open the kink by unlooping the cable.		Do not pack the cable to fit a tight space. Use an alternative cable route.

	Do not straighten the cable to correct a bend that is too tight. Leave the cable bend as is.		Do not hang the cable for a length more than 2 meters (7 feet). Minimize the hanging weight with intermediate retention points.
	Do not drop the cable or connectors from any height. Gently set the cable down, resting the cable connectors on a stable surface.		Do not cinch the cable with hard fasteners or cable ties. Use soft hook-and-loop fastener for bundling and securing cables.
	Do not drag the cable or its connectors over any surface. Carry the entire cable to and from the points of connection.		Do not force the cable connector into the receptacle by pushing on the cable. Apply connection or disconnection forces at the connector only.

Related Information

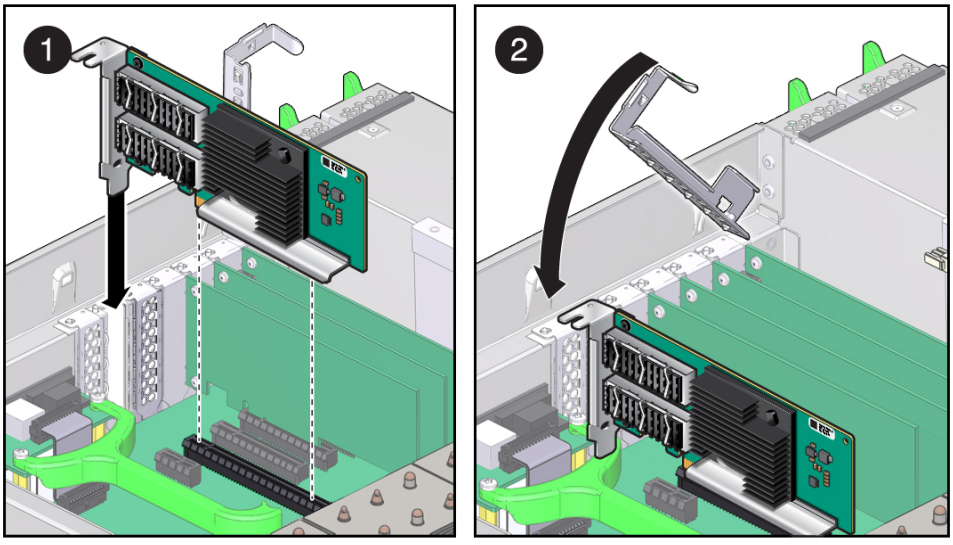
- “Order Additional Hardware” on page 38
- “Cable and Transceiver Overview” on page 38
- “Cable and Transceiver Descriptions” on page 39
- “Install the Adapter” on page 43
- “Install the QSFP+ Transceivers” on page 45
- “Verify the Adapter Installation (Oracle SPARC)” on page 47
- “Verify the Adapter Installation (Oracle Solaris x86)” on page 49
- “Verify the Adapter Installation (Linux)” on page 50
- “Verify the Adapter Installation (Windows)” on page 50

▼ Install the Adapter

These instructions describe the basic tasks required to install the adapter. Refer to the server's installation or service manual for specific PCIe installation instructions.

Note - The adapter is currently configured in the factory default 4x10GbE mode. There are two QSFP connector ports, port 0 (A) and port 1 (B). Only port 0 can be configured as a 4x10GbE port. By using a splitter cable, customers can get four 10GbE ports.

1. **Ensure that you have the appropriate additional hardware.**
   See “Order Additional Hardware” on page 38.
2. **Halt and power off the server.**
3. **Power off all of the peripherals connected to the server.**
4. **Open the server chassis.**
5. **Attach an antistatic wrist strap to the server chassis.**
6. **Remove the slot cover from the chassis.**
7. **Holding the adapter by the edges, align the card edge connector with the PCIe slot.**



8. **Slide the adapter face plate into the small slot at the end of the PCIe opening.**
9. **Applying even pressure at both corners of the adapter, push the adapter until it is firmly seated in the slot.**

Caution - Do not use excessive force when installing the adapter into the PCIe slot. You might damage the adapter's PCIe connector. If the adapter does not seat properly when you apply even pressure, remove the adapter, and carefully reinstall it.

10. **Detach the wrist strap and close the server.**

11. **Connect the appropriate cables to the ports.**
    See “Cable and Transceiver Overview” on page 38.

12. **Verify the installation.**
    See:
    “Verify the Adapter Installation (Oracle SPARC)” on page 47
    “Verify the Adapter Installation (Oracle Solaris x86)” on page 49
    “Verify the Adapter Installation (Linux)” on page 50
    “Verify the Adapter Installation (Windows)” on page 50

Related Information

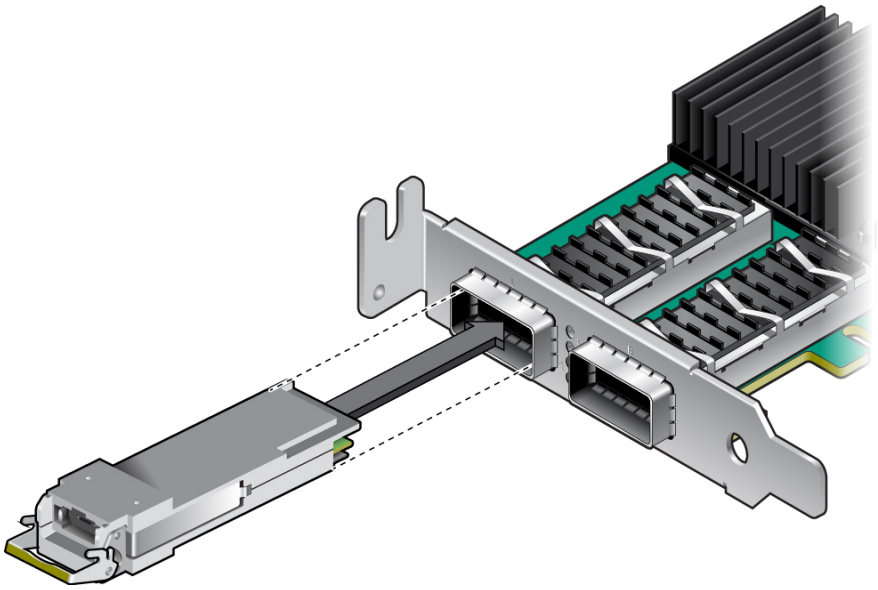
- “Order Additional Hardware” on page 38
- “Cable and Transceiver Overview” on page 38
- “Cable and Transceiver Descriptions” on page 39
- “Cable Cautions” on page 42
- “Install the QSFP+ Transceivers” on page 45
- “Verify the Adapter Installation (Oracle SPARC)” on page 47
- “Verify the Adapter Installation (Oracle Solaris x86)” on page 49
- “Verify the Adapter Installation (Linux)” on page 50
- “Verify the Adapter Installation (Windows)” on page 50

▼ Install the QSFP+ Transceivers

When using the adapter in the 4x10GbE mode, there are two cabling options. See “Cable and Transceiver Overview” on page 38. The optical transceivers are available from Oracle. Check the adapter product web page for available transceivers and cables at `http://www.oracle.com/goto/10gb-or-40gb-ethernet-adapter`.

Note - There are two QSFP connector ports, port 0 (A) and port 1 (B). Only Port 0 (A), can be configured as a 4x10GbE port. By using a splitter cable, you can get four 10GbE ports.

1. **Holding the optical transceiver by the edges, align the transceiver with the slot in the adapter and slide the transceiver into the opening.**



2. **Applying even pressure at both corners of the transceiver, push the transceiver until it is firmly seated in the slot.**
3. **Repeat Step 1 and Step 2 to install the second optical transceiver.**
4. **Power on the server.**
5. **Verify the adapter installation.**

   See:

   "Verify the Adapter Installation (Oracle SPARC)" on page 47

   "Verify the Adapter Installation (Oracle Solaris x86)" on page 49

   "Verify the Adapter Installation (Linux)" on page 50

   "Verify the Adapter Installation (Windows)" on page 50

Related Information

- "Order Additional Hardware" on page 38
- "Cable and Transceiver Overview" on page 38

▼ Verify the Adapter Installation (Oracle SPARC)

Note - Verification is not required if the server supports DR.

1. **Power on the server.**
2. **When the banner appears, press the Stop-A keys or send the break signal to interrupt the boot process and display the OpenBoot (`ok`) prompt.**
3. **List the network devices.**

```
ok show-nets
a) /niu@480/network@0
b) /pci@400/pci@2/pci@0/pci@c/network@0,3
c) /pci@400/pci@2/pci@0/pci@c/network@0,2
d) /pci@400/pci@2/pci@0/pci@c/network@0,1
e) /pci@400/pci@2/pci@0/pci@c/network@0
f) /pci@400/pci@2/pci@0/pci@a/network@0,1
g) /pci@400/pci@2/pci@0/pci@a/network@0
q) NO SELECTION
Enter Selection, q to quit: q
```

4. **Check the `.properties` output for each device.**

Note - Checking the `.properties` output for each device is the surest way to identify the device.

These examples assume that `/pci@400/pci@2/pci@0/pci@c/network@0` is a port on the adapter.

   a. **Change to the device directory.**

```
ok cd /pci@400/pci@2/pci@0/pci@c/network@0
```

   b. **Display properties for the device.**

```
ok .properties
```

The output should be similar to this:

```
vf-assigned-addresses    c3060000 00000041 00810000 00000000 00010000
                         c3060003 00000041 00a10000 00000000 00004000
assigned-addresses       c3060010 00000041 00000000 00000000 00800000
                         c306001c 00000041 00800000 00000000 00008000
                         82060030 00000000 01200000 00000000 00080000
vf-reg                   43060000 00000000 00000000 00000000 00010000
                         43060003 00000000 00000000 00000000 00004000
reg                      00060000 00000000 00000000 00000000 00000000
                         43060010 00000000 00000000 00000000 00800000
                         4306001c 00000000 00000000 00000000 00008000
                         02060030 00000000 00000000 00000000 00080000
local-mac-address        3c fd fe 9f 00 a0
version                  Oracle Quad 10Gb or Dual 40Gb Ethernet Adapter
FCode 3.4 1/29/2016
board-model              7096437
model                    7111185/7111186
compatible               pciex8086,1583.108e.7b1d.2
                         pciex8086,1583.108e.7b1d
                         pciex8086,1583.2
                         pciex8086,1583
                         pciexclass,020000
                         pciexclass,0200
address-bits             00000030
max-frame-size
                         00002400
network-interface-type
                         ethernet
device_type              network
name                     network
fcode-rom-offset         00056000
vf-stride                00000001
first-vf-offset          00000010
total-vfs                00000020
initial-vfs              00000020
#vfs                     00000020
port-type                PCIE-Endpoint
interrupts               00000001
cache-line-size          00000010
class-code               00020000
subsystem-id             00007b1d
subsystem-vendor-id      0000108e
revision-id              00000002
device-id                00001583
vendor-id                00008086
{0} ok
```

If you do not see the device listed, check that the adapter is properly seated. If necessary, reinstall the adapter.

c. **Type:**

```
ok device-end
```

Related Information

- “Order Additional Hardware” on page 38
- “Cable and Transceiver Overview” on page 38
- “Cable and Transceiver Descriptions” on page 39
- “Cable Cautions” on page 42
- “Install the Adapter” on page 43
- “Install the QSFP+ Transceivers” on page 45
- “Verify the Adapter Installation (Oracle Solaris x86)” on page 49
- “Verify the Adapter Installation (Linux)” on page 50
- “Verify the Adapter Installation (Windows)” on page 50

▼ Verify the Adapter Installation (Oracle Solaris x86)

1. **Power on the server, and then boot the server.**

2. **Check the driver version.**

```
# modinfo|grep i40e
173 7b762000  17998 100   1  i40e (Intel 10Gb Ethernet 1.0.14)
```

See “Hardware and Software Requirements” on page 21 for more information.

3. **Check to see if the adapter is properly installed and recognized by the OS.**

```
# grep i40e /etc/path_to_inst
```

If the adapter is properly installed, you should see output similar to this:

```
root@t7-1a:~# grep i40 /etc/path_to_inst
“/pci@302,/pci@1/ethernet@0” 8 “i40e”
“/pci@302,/pci@1/ethernet@0,1” 9 “i40e”
“/pci@302,/pci@1/ethernet@0,2” 10 “i40e”
“/pci@302,/pci@1/ethernet@0,3” 11 “i40e”
“/pci@302,/pci@1/ethernet@0” 4 “i40e”
```

Related Information

- “Order Additional Hardware” on page 38
- “Cable and Transceiver Overview” on page 38
- “Cable and Transceiver Descriptions” on page 39
- “Cable Cautions” on page 42
- “Install the Adapter” on page 43
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- “Verify the Adapter Installation (Oracle SPARC)” on page 47
- “Verify the Adapter Installation (Linux)” on page 50
- “Verify the Adapter Installation (Windows)” on page 50

▼ Verify the Adapter Installation (Linux)

- **Verify the new network interface instances corresponding to the adapter.**

```
# ifconfig -a | grep eth
eth3   Link encap:Ethernet  HWaddr 00:1B:21:17:67:B0
eth4   Link encap:Ethernet  HWaddr 00:1B:21:17:67:9B
```

Related Information

- “Order Additional Hardware” on page 38
- “Cable and Transceiver Overview” on page 38
- “Cable and Transceiver Descriptions” on page 39
- “Cable Cautions” on page 42
- “Install the Adapter” on page 43
- “Install the QSFP+ Transceivers” on page 45
- “Verify the Adapter Installation (Oracle SPARC)” on page 47
- “Verify the Adapter Installation (Oracle Solaris x86)” on page 49
- “Verify the Adapter Installation (Windows)” on page 50

▼ Verify the Adapter Installation (Windows)

1. **Click Control Panel.**
2. **Click Network Connection.**

   If the driver is installed correctly, the Ethernet adapter interfaces labeled as "Intel(R) I450 10-Gigabit Dual Port Network Connection” will be displayed on the Network Connection screen.

3. **In the Administration tool, click Computer Management, Device Manager, and Network Adapter.**

4. **Check the driver version.**

   - The minimum Windows Server 2008 driver version is `i40ea62`.
   - The minimum Windows Server 2012 driver version is `i40ea63`.
   - The minimum Windows Server 2012 R2 driver version is `i40ea64`.

Related Information

- "Order Additional Hardware" on page 38
- "Cable and Transceiver Overview" on page 38
- "Cable and Transceiver Descriptions" on page 39
- "Cable Cautions" on page 42
- "Install the Adapter" on page 43
- "Install the QSFP+ Transceivers" on page 45
- "Verify the Adapter Installation (Oracle SPARC)" on page 47
- "Verify the Adapter Installation (Oracle Solaris x86)" on page 49
- "Verify the Adapter Installation (Linux)" on page 50

Configuring the Network

These topics describe how to configure the network for the adapter.

Description	Links
Configure the network for an Oracle Solaris server.	“Configure the Network Interface (Oracle Solaris)” on page 53
Boot over the network.	“Boot Options” on page 54 “Boot Over the Network (PXE)” on page 55 “Boot Over a 10GbE Network (Oracle Solaris x86/x64 and Linux)” on page 55
Install the Oracle Solaris OS over the network.	“Install Oracle Solaris 11 Over a Network (Oracle SPARC)” on page 57

Related Information

- “Understanding the Installation Process” on page 11
- “Understanding the Adapter” on page 15
- “Confirming Specifications and Requirements” on page 19
- “Updating Software and Firmware” on page 23
- “Installing the Driver” on page 27
- “Installing the Adapter” on page 37
- “Configuring Driver Parameters” on page 61
- “Configuring Jumbo Frames” on page 67
- “Configuring a Link Aggregation” on page 71
- “Configuring VLANs and VXLANs” on page 75
- “Removing the Driver” on page 81
- “Troubleshooting the Adapter (Oracle Solaris)” on page 85

▼ Configure the Network Interface (Oracle Solaris)

1. **Display the `i40e`(7D) instances.**

```
# dladm show-phys
```

The output should include lines similar to this:

```
LINK              MEDIA                STATE      SPEED  DUPLEX    DEVICE
net2              Ethernet             unknown    0      unknown   ixgbe2
net1              Ethernet             unknown    0      unknown   ixgbe1
net0              Ethernet             up         1000   full      ixgbe0
net3              Ethernet             unknown    0      unknown   ixgbe3
net6              Ethernet             up         10     full      usbecm0
net4              Ethernet             up         40000  full      i40e0
net5              Ethernet             up         40000  full      i40e1
```

2. **Use the `ipadm`(1M) command to set up the `i40e`(7D) interfaces.**

   Your `ipadm` command might look similar to this:

   ```
   # ipadm create-ip net4
   # ipadm create-addr -T static -a local=10.2.3.4/24 net4/v4
   ```

   This command creates another address `10.2.3.5/24` on interface `net1`, but marks the address down until explicitly marked up:

   ```
   # ipadm create-addr -T static -d -a 10.2.3.5/24 net4/v4
   ```

   This command marks the address object `net4/v4a` up that was previously marked down.

   ```
   # ipadm up-addr net4/v4a
   ```

Related Information

- “Configure the Network Interface (Oracle Solaris)” on page 53
- “Boot Options” on page 54
- “Boot Over the Network (PXE)” on page 55
- “Boot Over a 10GbE Network (Oracle Solaris x86/x64 and Linux)” on page 55
- “Install Oracle Solaris 11 Over a Network (Oracle SPARC)” on page 57

Boot Options

The adapter supports several boot options:

- UEFI with PXE with option ROM (Oracle x86/x64)

- UEFI with iSCSI with option ROM (Oracle x86/x64 and Oracle SPARC)
- OpenBoot PROM (`bootp`) with PF (Oracle SPARC servers supporting LDOMs)

The *Oracle Solaris Advanced Installation Guide* includes more information about boot options and describes how to create a boot server.

Related Information

- “Configure the Network Interface (Oracle Solaris)” on page 53
- “Boot Over the Network (PXE)” on page 55
- “Boot Over a 10GbE Network (Oracle Solaris x86/x64 and Linux)” on page 55
- “Install Oracle Solaris 11 Over a Network (Oracle SPARC)” on page 57

▼ Boot Over the Network (PXE)

PXE network boot is an environment for booting computers using a network interface independently of available data storage devices (such as hard disks) or installed OS. No boot media is required on the client system. With PXE, you can install an OS on an x86-based client over the network by using DHCP.

- **Boot over the network using PXE.**

  Refer to the booting with PXE instructions in the *Oracle Solaris 11 Installation Guide: Network-Based Installations* at:

  `http://docs.oracle.com/cd/E23823_01/index.html`

Related Information

- “Configure the Network Interface (Oracle Solaris)” on page 53
- “Boot Options” on page 54
- “Boot Over a 10GbE Network (Oracle Solaris x86/x64 and Linux)” on page 55
- “Install Oracle Solaris 11 Over a Network (Oracle SPARC)” on page 57

▼ Boot Over a 10GbE Network (Oracle Solaris x86/x64 and Linux)

1. **Obtain the MAC address of the first adapter port by checking the label of the adapter.**

On the adapter, the MAC address on the label is for the first port. The second port's MAC address is the MAC address from the label, plus 1.

2. **Set up the PXE boot server with the MAC addresses.**
3. **Plug the Ethernet cable into the adapter's port.**
4. **Power on the server.**
5. **Press the F2 key or the Control-E keys to go to the BIOS menu.**
6. **Go to the Boot - Boot Device Priority screen and ensure that the boot order of the network devices is higher than the hard drive.**
7. **Press the F10 key to save the boot configuration changes and exit BIOS.**
   The server should reboot after saving the boot configuration.
8. **On Oracle platforms, press the F12 key to install the OS from the network.**
   If the cable is connected to the correct port, you should see the MAC address that you assigned to your PXE server displayed by BIOS. If your platform does not support the F12 key, you might need to boot from the BIOS.

```
Intel(R) Boot Agent GE v1.3.31
Copyright (C) 1997-2009, Intel Corporation

Initializing and establishing link...

           ************************************************
           *           Please select boot device:         *
           ************************************************
           * HDD:P1-SEAGATE ST95001NSSUN500G 111          *
           * PXE:Slot1.F0:IBA XE Slot 0700 v2193          *
           * PXE:Slot1.F1:IBA XE Slot 0701 v2193          *
           * PXE:Slot0.F0:IBA XE Slot 0D00 v2193          *
           * PXE:Slot0.F1:IBA XE Slot 0D01 v2193          *
           * PXE:IBA GE Slot 1F00 v1331                   *
           * PXE:IBA GE Slot 1F01 v1331                   *
           *                                              *
           *                                              *
           *                                              *
           ************************************************
           *           * and * to move selection          *
           *          ENTER to select boot device         *
           *           ESC to boot using defaults         *
           ************************************************

Intel(R) Boot Agent XE v2.1.93
Copyright (C) 1997-2011, Intel Corporation

CLIENT MAC ADDR: A0 36 9F 02 37 A4  GUID: FF200008 FFFF FFFF FFFF CE8C75282100
```

```
CLIENT IP: 10.134.155.174  MASK: 255.255.255.0  DHCP IP: 10.134.155.4
```

9. **Install the `i40e`(7D) driver, and configure the adapter.**

10. **After the OS installation completes, use the BIOS to change the boot device priority to boot from hard disk to boot up the newly installed OS.**
    Unless you change the boot device priority, the OS installation process repeats.

Related Information

- "Configure the Network Interface (Oracle Solaris)" on page 53
- "Boot Options" on page 54
- "Boot Over the Network (PXE)" on page 55
- "Install Oracle Solaris 11 Over a Network (Oracle SPARC)" on page 57

▼ Install Oracle Solaris 11 Over a Network (Oracle SPARC)

The *Oracle Solaris Advanced Installation Guide* describes the full procedure for installing the Oracle Solaris 11 OS over the network.

1. **Prepare an installation server and a client server for installing the Oracle Solaris 11 OS over the network.**

   a. **Create an installation server that contains the image of the Oracle Solaris 11 CD.**

   b. **Set up the client server to be installed over the network.**
      The *Oracle Solaris Advanced Installation Guide* describes how to create the installation server and set up the client server.

Note - To install the client server over a network that is not part of the same subnet, you must also create a boot server. The *Oracle Solaris Advanced Installation Guide* describes how to create a boot server.

---

2. **Shut down and halt the client server to get to the OpenBoot (`ok`) prompt.**

```
# shutdown -i0 -g0 -y. . .
(shutdown command messages omitted)
. . .
ok
```

3. **Check the `.properties` output for each device.**
   These examples assume that `/pci@400/pci@1/pci@0/pci@8/network@0` is a port on the adapter.

a. Change to the device directory.

```
ok cd /pci@400/pci@1/pci@0/pci@8/network@0
```

b. Display properties for the device.

```
ok .properties
```

The output should be similar to this:

```
vf-assigned-addresses    c3060000 00000041 00810000 00000000 00010000
                         c3060003 00000041 00a10000 00000000 00004000
assigned-addresses       c3060010 00000041 00000000 00000000 00800000
                         c306001c 00000041 00800000 00000000 00008000
                         82060030 00000000 01200000 00000000 00080000
vf-reg                   43060000 00000000 00000000 00000000 00010000
                         43060003 00000000 00000000 00000000 00004000
reg                      00060000 00000000 00000000 00000000 00000000
                         43060010 00000000 00000000 00000000 00800000
                         4306001c 00000000 00000000 00000000 00008000
                         02060030 00000000 00000000 00000000 00080000
local-mac-address        3c fd fe 9f 00 a0
version                  Oracle Quad 10Gb or Dual 40Gb Ethernet Adapter
FCode 3.4 1/29/2016
board-model              7096437
model                    7111185/7111186
compatible               pciex8086,1583.108e.7b1d.2
                         pciex8086,1583.108e.7b1d
                         pciex8086,1583.2
                         pciex8086,1583
                         pciexclass,020000
                         pciexclass,0200
address-bits             00000030
max-frame-size
                         00002400
network-interface-type
                         ethernet
device_type              network
name                     network
fcode-rom-offset         00056000
vf-stride                00000001
first-vf-offset          00000010
total-vfs                00000020
initial-vfs              00000020
#vfs                     00000020
port-type                PCIE-Endpoint
interrupts               00000001
cache-line-size          00000010
class-code               00020000
subsystem-id             00007b1d
```

```
subsystem-vendor-id      0000108e
revision-id              00000002
device-id                00001583
vendor-id                00008086
{0} ok
```

If you do not see the device listed, check that the adapter is properly seated. If necessary, reinstall the adapter.

c. When you finish looking at the `.properties` values, type:

```
ok device-end
```

4. At the `ok` prompt, display the device paths.

You should see the full paths of all of the network devices, including two for the adapter similar to this example.

```
ok show-nets
a) /niu@480/network@0
b) /pci@400/pci@2/pci@0/pci@c/network@0,3
c) /pci@400/pci@2/pci@0/pci@c/network@0,2
d) /pci@400/pci@2/pci@0/pci@c/network@0,1
e) /pci@400/pci@2/pci@0/pci@c/network@0
f) /pci@400/pci@2/pci@0/pci@a/network@0,1
g) /pci@400/pci@2/pci@0/pci@a/network@0
q) NO SELECTION
Enter Selection, q to quit: q
```

5. At the `ok` prompt, boot the client server using the full device path of the device.

For example, type:

```
ok boot /pci@400/pci@2/pci@0/pci@c/network@0:dhcp
```

The boot takes several minutes to complete. Then, you should see a menu for continuing to install the Oracle Solaris 11 OS.

6. Proceed with the Oracle Solaris 11 OS installation.

Refer to the *Oracle Solaris Advanced Installation Guide* for more information about installing the Oracle Solaris 11 OS over the network.

7. Install the adapter software on the client server.

The software installed in Step 5 is required to boot the client server over the adapter interface. You now must install the software in order for the OS to use the client's interfaces in normal operation.

Before installing the SUNWi40e driver, ensure that the client server does not already have the driver installed.

```
# pkginfo | grep SUNWi40e*
```

- **If the software is installed, this command will return the package name you typed in. In that case, skip to Step 8.**
- **If needed, install the software from the download center at:**

  https://support.oracle.com

8. **Display the configuration information for all datalinks or the specified datalink.**

   By default, the server is configured to have one datalink for each known network device.

```
# dladm show-phys
```

The output should include lines similar to this:

```
LINK              MEDIA                STATE      SPEED  DUPLEX    DEVICE
net2              Ethernet             unknown    0      unknown   ixgbe2
net1              Ethernet             unknown    0      unknown   ixgbe1
net0              Ethernet             up         1000   full      ixgbe0
net3              Ethernet             unknown    0      unknown   ixgbe3
net6              Ethernet             up         10     full      usbecm0
net4              Ethernet             up         40000  full      i40e0
net5              Ethernet             up         40000  full      i40e1
```

Related Information

- “Configure the Network Interface (Oracle Solaris)” on page 53
- “Boot Options” on page 54
- “Boot Over the Network (PXE)” on page 55
- “Boot Over a 10GbE Network (Oracle Solaris x86/x64 and Linux)” on page 55

Configuring Driver Parameters

The `i40e`(7D) device driver controls the adapter's interfaces. You can manually set the `i40e`(7D) device driver parameters to customize each device in the server.

These topics describe how to configure driver parameters.

Description	Links
Configure driver parameters in the Oracle Solaris OS.	“Set Driver Parameters (Oracle Solaris)” on page 61 “Driver Parameters (Oracle Solaris)” on page 63
Configure driver parameters in Linux.	“Set Driver Parameters (Linux)” on page 64 “Driver Parameters (Linux)” on page 65

Related Information

- “Understanding the Installation Process” on page 11
- “Understanding the Adapter” on page 15
- “Confirming Specifications and Requirements” on page 19
- “Updating Software and Firmware” on page 23
- “Installing the Driver” on page 27
- “Installing the Adapter” on page 37
- “Configuring the Network” on page 53
- “Configuring Jumbo Frames” on page 67
- “Configuring a Link Aggregation” on page 71
- “Configuring VLANs and VXLANs” on page 75
- “Removing the Driver” on page 81
- “Troubleshooting the Adapter (Oracle Solaris)” on page 85

▼ Set Driver Parameters (Oracle Solaris)

1. **Locate the path names and the associated instance numbers in the `/etc/path_to_inst` file.**

For example, on an Oracle SPARC server, you should see output similar to this:

```
# grep i40e /etc/path_to_inst
"/pci@500/pci@2/pci@0/pci@a/network@0" 1 "i40e"
"/pci@500/pci@2/pci@0/pci@a/network@0,1" 2 "i40e"
```

On an Oracle Solaris x86 server, you should see output similar to this:

```
# grep i40e /etc/path_to_inst
"/pci@0,0/pci8086,3c0a@3,2/pci108e,7b15@0" 0 "i40e"
"/pci@0,0/pci8086,3c0a@3,2/pci108e,7b15@0,1" 1 "i40e"
```

In these preceding examples:

- The first part within the double quotes specifies the hardware node name in the device tree.
- The number not enclosed in quotes is the instance number (shown in bold for emphasis).
- The last part in double quotes is the driver name.

Note - To identify a PCIe device unambiguously in the `i40e.conf` file, use the name, parent name, and unit address for the device. In the example, the name is `pci108e,7b15`, the parent is `/pci@0,0/pci8086,3c0a@3,2`, and the unit address is `0`. Refer to the `pci`(4) man page for more information about the PCIe device specification.

---

2. Set the parameters for the `i40e`(7D) devices in one of these ways:

a. Copy the i40e.conf file to the `/etc/driver/drv/` and edit the copied file.

Save the i40e.conf file.

Reboot the system.

See “Driver Parameters (Oracle Solaris)” on page 63.

For example, to set the `rx_ring_size` parameter to `3` for `i40e0`:

```
#   "/pci@340/pci@1/pci@0/pci@5/ethernet@0" 0 "i40e"
#   "/pci@340/pci@1/pci@0/pci@5/ethernet@0,1" 1 "i40e"
#
#   name = "pciex8086,1583" parent = "/pci@340/pci@1/pci@0/pci@5"
    unit-address = "0"
# rx_ring_size = 2048;
```

b. Use the `dladm` command to set a property.

```
# dladm show-linkprop -p flowctrl  net5
```

```
LINK     PROPERTY        PERM VALUE        EFFECTIVE    DEFAULT   POSSIBLE
net5     flowctrl        rw   no           no           no        no,tx,rx,bi,
                                 pfc,auto
flow_control = 3;
```

For bidirectional flow control, type:

```
# dladm set-linkprop -p flowctrl=bi  net5
```

Related Information

- “Driver Parameters (Oracle Solaris)” on page 63
- “Set Driver Parameters (Linux)” on page 64

Driver Parameters (Oracle Solaris)

You can configure these parameters on each `i40e`(7D) interface.

Type	Keyword	Description
Jumbo frames	`default_mtu=`*mtu*	Size of the default MTU (payload without the Ethernet header). Allowed values: `1500` to `9706` (default = `1500`)
Flow control	`flow_control`	Ethernet flow control. Allowed values: `0` - Disable (default in Oracle Solaris 11) `1` - Receive only `2` - Transmit only `3` - Receive and transmit
LAN VSI queue pairs	`num_lan_queue_pairs`	The number of queue pairs for the default LAN VSI. Allowed values: `1` to `64` (default = `32`)
VMDq VSI queue pairs	`num_vmdq_queue_pairs`	The number of queue pairs for VMDq VSI. Allowed values: `1` to `16` (default = `2`)
VMDq VSIs	`num_vmdq_vsis`	The number of VMDq VSIs. Allowed values: `0` to `64` (default = `0`)
Queue pairs	num_lan_queue_pairs	The number of queue pairs for the default LAN VSI Allowed values: `1` - `64` Default value: `32`
Transmit queue size	`tx_ring_size`	Number of the transmit descriptors per transmit queue. The actual value is rounded up to the next multiple of 8. Allowed values:

Type	Keyword	Description
		64 to 4096 (default = 1024)
Receive queue size	rx_ring_size	Number of the transmit descriptors per receive queue. The actual value is rounded up to the next multiple of 8. Allowed values: 64 to 4096 (default = 1024)
Receive interrupts	rx_itr	The interval of receive interrupts is defined in 2 usec units enabling interval range from zero to 8160 usec (0xFF0). Setting the rx_itr to zero enables immediate interrupt. Allowed values: 0 to 4080 (default = 25)
Transmit interrupts	tx_itr	The interval of transmit interrupts is defined in 2 usec units enabling interval range from zero to 8160 usec (0xFF0). Setting the tx_itr to zero enables immediate interrupt. Allowed values: 0 to 4080 (default = 25)
Rx interrupts	rx_limit_per_intr	Maximum number of packet to receive per interrupt. Allowed values: 16 to 4096 (default = 1024)
Rx bcopy threshold	rx_copy_threshold	Packet size to determine bcopy or not during receive. Allowed values: 0 to 9216 (default = 128)
Tx bcopy threshold	tx_copy_threshold	Packet size to determine bcopy or not during transmit. Allowed values: 0 ~ 9216, 128 by default 0 to 9216 (default = 128)

Related Information

- “Driver Parameters (Oracle Solaris)” on page 63
- “Set Driver Parameters (Linux)” on page 64
- “Driver Parameters (Linux)” on page 65

▼ Set Driver Parameters (Linux)

- **Use the `ethtool` utility or the `configtool` utility to set parameters on a Linux platform.**

  See “Driver Parameters (Linux)” on page 65.

Related Information

- “Set Driver Parameters (Oracle Solaris)” on page 61
- “Driver Parameters (Oracle Solaris)” on page 63
- “Driver Parameters (Linux)” on page 65

Driver Parameters (Linux)

This table lists the tunable `i40e`(7D) driver parameters for Linux OS and describes their functions.

Keyword	Valid Range	Default Value	Description
`FlowControl`	`0` to `3` (`0`=none, `1`=RX only, `2`=TX only, `3`=RX and TX)	Read from the EEPROM. If EEPROM is not detected, default is 3.	Controls the automatic generation (TX) and response (RX) to Ethernet PAUSE frames.
`RxDescriptiors`	`64` to `4096`	`512`	Number of receive descriptors allocated by the driver. Increasing this value allows the driver to buffer more incoming packets. Each descriptor is 16 bytes. A receive buffer is also allocated for each descriptor and can be either 2048, 4056, 8192, or 16384 bytes, depending on the MTU setting. When the MTU size is 1500 or less, the receive buffer size is 2048 bytes. When the MTU is greater than 1500, the receive buffer size is either 4056, 8192, or 16384 bytes. The maximum MTU size is 16114.
`RxIntDelay`	`0` to `65535` (`0`=off)	`72`	Delays the generation of receive interrupts in units of 0.8192 microseconds. Receive interrupt reduction can improve CPU efficiency if properly tuned for specific network traffic. Increasing this value adds extra latency to frame reception and can end up decreasing the throughput of TCP traffic. If the system is reporting dropped receives, this value might be set too high, causing the driver to run out of available receive descriptors.
`TxDescriptors`	`80` to `4096`	`256`	Number of transmit descriptors allocated by the driver. Increasing this value allows the driver to queue more transmits. Each descriptor is 16 bytes.
`XsumRX`	`0` to `1`	`1`	A value of 1 indicates that the driver should enable IP checksum offload for received packets (both UDP and TCP) to the Ethernet adapter hardware.

Related Information

- “Set Driver Parameters (Oracle Solaris)” on page 61
- “Driver Parameters (Oracle Solaris)” on page 63
- “Set Driver Parameters (Linux)” on page 64

Configuring Jumbo Frames

Jumbo frames can support up to 9706 MTU. The default value is 1500 MTU.

Related Information

- "Understanding the Installation Process" on page 11
- "Understanding the Adapter" on page 15
- "Confirming Specifications and Requirements" on page 19
- "Updating Software and Firmware" on page 23
- "Installing the Driver" on page 27
- "Installing the Adapter" on page 37
- "Configuring the Network" on page 53
- "Configuring Jumbo Frames" on page 67
- "Configuring a Link Aggregation" on page 71
- "Configuring VLANs and VXLANs" on page 75
- "Removing the Driver" on page 81
- "Troubleshooting the Adapter (Oracle Solaris)" on page 85

▼ Change the MTU Permanently (Oracle Solaris)

- **Take one of these actions.**

  - Add this line in the `/etc/driver/drv/i40e.conf` file and reboot the server.

    `default_mtu =` *desired-frame-size;*

    where *desired-frame-size* value can range from `1500` to `9706`.

Note - Adding this line will make changes to all instances of i40e. To change for specific instances, see Step 2 in Set Driver Parameters (Oracle Solaris).

- Type:

```
# dladm set-linkprop -p mtu=9706 net0
```

Related Information

- “Change the MTU Temporarily (Oracle Solaris)” on page 68
- “Configure Jumbo Frames (Linux)” on page 68

▼ Change the MTU Temporarily (Oracle Solaris)

- **Use the `dladm`(1M) command.**

  For example, where the device name is `xnet0`, this command increases MTUs to the maximum:

```
# dladm set-linkprop [-t] -p mtu=9706 net0
```

  The temporary setting lasts only until the next reboot of the server.

Related Information

- “Change the MTU Permanently (Oracle Solaris)” on page 67
- “Configure Jumbo Frames (Linux)” on page 68

▼ Configure Jumbo Frames (Linux)

Jumbo frames can support up to 9706 MTU. The default value is 1500 MTU.

- **Use the `ifconfig`(1M) command.**

  For example, where the IP address for `eth7` is `192.1.1.200`, the following command increases MTUs to the maximum:

```
# ifconfig eth7 192.1.1.200 mtu 9706 up
```

Related Information

- “Change the MTU Temporarily (Oracle Solaris)” on page 68

- “Change the MTU Permanently (Oracle Solaris)” on page 67

Configuring a Link Aggregation

These topics describe how to configure link aggregation in the Oracle Solaris 11 OS. For more instructions on link aggregations in the Oracle Solaris 11 OS, refer to *Oracle Solaris Administration: Network Interfaces and Network Virtualization* in the Oracle Solaris 11 documentation library.

Related Information

- "Understanding the Installation Process" on page 11
- "Understanding the Adapter" on page 15
- "Confirming Specifications and Requirements" on page 19
- "Updating Software and Firmware" on page 23
- "Installing the Driver" on page 27
- "Installing the Adapter" on page 37
- "Configuring the Network" on page 53
- "Configuring Driver Parameters" on page 61
- "Configuring Jumbo Frames" on page 67
- "Configuring VLANs and VXLANs" on page 75
- "Removing the Driver" on page 81
- "Troubleshooting the Adapter (Oracle Solaris)" on page 85

▼ Configure a Link Aggregation (Oracle Solaris 11)

The example in this procedure aggregates sample interfaces `i40e0`, `i40e1`, `i40e2`, and `i40e3`. Arbitrary key numbers (`1` and `2`) are used for each aggregation.

Note - These commands change the contents of the `/etc/aggregation.conf` file.

- **Configure the link aggregation containing the `i40e` interfaces in the default mode. For example:**

```
# dladm create-aggr -l net5 -l net6 aggr1
# dladm show-aggr
# ipadm create-ip aggr1
# ipadm create-addr -a 192.1.1.14/24 aggr1
```

For more information on link aggregation, refer to *Managing Oracle Solaris 11.1 Network Performance* at:

https://docs.oracle.com/cd/E26502_01/index.html

Related Information

- "Display Information About a Link Aggregation (Oracle Solaris)" on page 72
- "Delete a Link Aggregation (Oracle Solaris)" on page 73

▼ Display Information About a Link Aggregation (Oracle Solaris)

The `ipadm`(1M) and `dladm`(1M) commands provide different details about link aggregations, as in these examples.

- **Use the appropriate command to obtain the desired results.**

  - **Use the `ifconfig`(1M) command to examine the details about a link aggregation.**

```
# ifconfig aggr1
aggr1: flags=1000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4> mtu 1500 index 32
 inet 192.2.2.84 netmask ffffff00 broadcast 192.2.2.255
 ether 0:15:17:75:ff:81

# ifconfig aggr2
aggr2: flags=1000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4> mtu 1500 index 33
 inet 193.2.2.84 netmask ffffff00 broadcast 193.2.2.255
 ether 0:15:17:75:ff:83
```

  - **Use the `dladm show-aggr` command to show link aggregation status.**

    For more information about link aggregation, go to:

    http://docs.oracle.com/cd/E23824_01/html/821-1458/gdysx.html#scrolltoc

Related Information

- “Configure a Link Aggregation (Oracle Solaris 11)” on page 71
- “Delete a Link Aggregation (Oracle Solaris)” on page 73

▼ Delete a Link Aggregation (Oracle Solaris)

1. **Delete the IP interface that is configured over the link aggregation.**

   For example, type:

   ```
   # ipadm delete-ip ip-aggr1
   ```

   where `ip-aggr1` is the IP interface over the link aggregation.

2. **Delete each unwanted link aggregation.**

   For example:

   ```
   # dladm delete-aggr aggr2
   # dladm delete-aggr aggr2
   ```

Related Information

- “Configure a Link Aggregation (Oracle Solaris 11)” on page 71
- “Display Information About a Link Aggregation (Oracle Solaris)” on page 72

Configuring VLANs and VXLANs

These topics explain how to configure VLANs and VXLANs.

Related Information

VLANs Overview

Virtual LANs enable you to divide the network into subnetworks without having to add to the physical network environment. The subnetworks are virtual and use the same physical network resources. VLANs facilitate network administrations because the smaller groups are easier to maintain.

You can create VLANs according to various criteria, but each VLAN must be assigned a VLAN tag or VLAN ID (VID). The VID is a 12-bit identifier between 1 and 4094 that identifies a unique VLAN.

Note - If you configure a VLAN virtual device for an Ethernet adapter, all traffic sent or received by that Ethernet adapter must be in VLAN-tagged format.

For more information on administering VLANs, refer to *Managing Oracle Solaris 11.1 Newtwork Performance* at:

http://docs.oracle.com/cd/E26502_01/html/E28993/gmbab.html#scrolltoc

Related Information

- “Configure VLANs (Oracle Solaris)” on page 76
- “Configure VLANs (Linux)” on page 77
- “Configure VLANs (Windows)” on page 78
- “Configure VXLANs (Oracle Solaris)” on page 79

▼ Configure VLANs (Oracle Solaris)

1. **Determine the types of links that are used in the server.**

```
# dladm show-phys | grep i40e
net4              Ethernet             up         10000  full      i40e0
net6              Ethernet             up         10000  full      i40e2
net5              Ethernet             up         10000  full      i40e1
net7              Ethernet             up         10000  full      i40e3
```

2. **Create a VLAN link over a datalink.**

```
# dladm create-vlan -l link -v vid vlan-link
```

where *link* specifies the link on which the VLAN interface is being created, *vid* indicates the VLAN ID number, and *vlan-link* specifies the name of the VLAN, which can also be an administratively-chosen name.

3. **Verify the VLAN configuration.**

```
# dladm show-vlan
```

4. **Create an IP interface over the VLAN.**

```
# ipadm create-ip interface
```

where *interface* uses the VLAN name.

Related Information

- “VLANs Overview” on page 75
- “Configure VLANs (Linux)” on page 77
- “Configure VLANs (Windows)” on page 78
- “Configure VXLANs (Oracle Solaris)” on page 79

▼ Configure VLANs (Linux)

1. **Ensure that the `i40e` module is loaded.**

   ```
   # modprobe i40e
   ```

2. **Plumb the adapter's interface.**

   ```
   # ifconfig eth6 ipv6addressup
   ```

   where *ipv6address* is the IP address of the interface.

3. **Add the VID.**

   For example, type:

   ```
   # vconfig add eth6 5
   ```

   where `eth6` is the interface, and `5` is the VID.

   Note - In Linux systems, you can use any single digit as the VID.

4. **Configure the `i40e` VLAN.**

   For example, type:

   ```
   # ifconfig eth6.5 ipv6addressup
   ```

   where *ipv6address* is the IP address of the interface.

Related Information

- “VLANs Overview” on page 75

- "Configure VLANs (Oracle Solaris)" on page 76
- "Configure VLANs (Windows)" on page 78
- "Configure VXLANs (Oracle Solaris)" on page 79

▼ Configure VLANs (Windows)

1. **Click Control Panel.**
2. **Click Network Connection.**
3. **Click the folder icon from the sub-manual bar.**
4. **Right-click the Oracle Quad 10Gb Ethernet Adapter port, then select Properties.**
5. **Click Configure.**
6. **Click VLAN, then click New.**
7. **Type `VLAN` with *ID* (for example, type `VLAN10`).**
8. **Click OK.**
9. **Open the Local Connections for VLAN window from the Network Connections window (Control Panel -> Network Internet -> Network Connections).**
10. **Right-click the Properties button, and select the TCP/IPv4 port in the list.**
11. **Click the Properties button, and fill in the desired IP address.**
12. **Click Subnet Mask.**

    The value `255.255.255.0` is displayed.
13. **Click OK.**
14. **Repeat Step 3 through Step 10 until all the network ports are VLAN configured.**

Note - Ensure that the firewall is configured to allow VLAN traffic. Otherwise, the VLAN might not operate properly.

Related Information

- "VLANs Overview" on page 75
- "Configure VLANs (Oracle Solaris)" on page 76

- "Configure VLANs (Linux)" on page 77
- "Configure VXLANs (Oracle Solaris)" on page 79

Configure VXLANs (Oracle Solaris)

VXLAN is a Layer 2 technology that enables you to create a Layer 2 network on top of a Layer 3 network, thereby providing further network isolation. VXLAN provides a virtual Layer 2 network that stretches over multiple physical Layer 2 networks. Provisioning resources in a cloud environment is not restricted to a single physical Layer 2 network. Physical servers can be a part of an VXLAN network, as long as they are connected by IPv4 or IPv6 networks.

1. **Determine the types of links that are used in the system.**

```
# dladm show-phys | grep i40e
net4              Ethernet            up         10000  full      i40e0
net6              Ethernet            up         10000  full      i40e2
net5              Ethernet            up         10000  full      i40e1
net7              Ethernet            up         10000  full      i40e3
```

2. **Create an IP interface over the VXLAN.**

```
# dladm create-vxlan -p addr=10.10.10.1,vni=100 vxlan1
# dladm create-vxlan -p addr=10.10.10.1,vni=101 vxlan2
```

3. **Verify the VXLAN configuration.**

```
# dladm show-vxlan
LINK                ADDR                    VNI   MGROUP
vxlan1              10.10.10.1              100   224.0.0.1
vxlan2              10.10.10.1              101   224.0.0.1
```

Related Information

- "VLANs Overview" on page 75
- "Configure VLANs (Oracle Solaris)" on page 76
- "Configure VLANs (Linux)" on page 77
- "Configure VLANs (Windows)" on page 78

Removing the Driver

These topics explain how to remove the `i40e` and `i40evf` device drivers.

It is not necessary to remove a driver when its associated device is removed from a server. However, if you want to clean up your file systems or conserve space, you can easily remove a driver.

Description	Links
Remove the driver on an Oracle Solaris server.	“Remove the `i40e/i40evf` Driver (Oracle Solaris)” on page 82
Remove the driver on a Linux server.	“Remove the `i40e` Driver (Linux)” on page 82 “Remove the `i40evf` Driver (Linux)” on page 82
Remove the driver on a Windows server.	“Remove the `i40e` Driver (Windows)” on page 83 “Remove the `i40evf` Driver (Windows)” on page 83

Related Information

- “Understanding the Installation Process” on page 11
- “Understanding the Adapter” on page 15
- “Confirming Specifications and Requirements” on page 19
- “Updating Software and Firmware” on page 23
- “Installing the Driver” on page 27
- “Installing the Adapter” on page 37
- “Configuring the Network” on page 53
- “Configuring Driver Parameters” on page 61
- “Configuring Jumbo Frames” on page 67
- “Configuring a Link Aggregation” on page 71
- “Configuring VLANs and VXLANs” on page 75
- “Troubleshooting the Adapter (Oracle Solaris)” on page 85

Remove the i40e/i40evf Driver (Oracle Solaris)

- **Type:**

```
# pkg uninstall i40e
```

Refer to the pkg(1M) man page for more information.

Related Information

- "Remove the i40e Driver (Linux)" on page 82
- "Remove the i40evf Driver (Linux)" on page 82
- "Remove the i40e Driver (Windows)" on page 83
- "Remove the i40evf Driver (Windows)" on page 83

Remove the i40e Driver (Linux)

- **Type:**

```
#rmmod i40e
```

Related Information

- "Remove the i40e/i40evf Driver (Oracle Solaris)" on page 82
- "Remove the i40evf Driver (Linux)" on page 82
- "Remove the i40e Driver (Windows)" on page 83
- "Remove the i40evf Driver (Windows)" on page 83

Remove the i40evf Driver (Linux)

- **Type:**

```
#rmmod i40evf
```

Related Information

- "Remove the i40e/i40evf Driver (Oracle Solaris)" on page 82
- "Remove the i40e Driver (Linux)" on page 82

- “Remove the i40e Driver (Windows)” on page 83
- “Remove the i40evf Driver (Windows)” on page 83

Remove the i40e Driver (Windows)

1. **From the Control Panel, double-click Add/Remove Programs.**
2. **Select Intel PRO Network Connections Drivers.**
3. **Click Add/Remove.**
4. **When the confirmation dialog displays, click OK.**

Related Information

- “Remove the i40e/i40evf Driver (Oracle Solaris)” on page 82
- “Remove the i40e Driver (Linux)” on page 82
- “Remove the i40evf Driver (Linux)” on page 82
- “Remove the i40evf Driver (Windows)” on page 83

Remove the i40evf Driver (Windows)

1. **From the Control Panel, double-click Add/Remove Programs.**
2. **Select Intel PRO Network Connections Drivers.**
3. **Click Add/Remove.**
4. **When the confirmation dialog displays, click OK.**

Related Information

- “Remove the i40e/i40evf Driver (Oracle Solaris)” on page 82
- “Remove the i40e Driver (Linux)” on page 82
- “Remove the i40evf Driver (Linux)” on page 82
- “Remove the i40e Driver (Windows)” on page 83

Troubleshooting the Adapter (Oracle Solaris)

These topics describe how to troubleshoot the installation and operation of the Oracle Quad 10 Gb or Dual 40 Gb Ethernet Adapter on an Oracle SPARC or x86 server running the Oracle Solaris 11 OS. These topics cover basic installation issues and are not intended to be comprehensive.

Related Information

- "Understanding the Installation Process" on page 11
- "Understanding the Adapter" on page 15
- "Confirming Specifications and Requirements" on page 19
- "Updating Software and Firmware" on page 23
- "Installing the Driver" on page 27
- "Installing the Adapter" on page 37
- "Configuring the Network" on page 53
- "Configuring Driver Parameters" on page 61
- "Configuring Jumbo Frames" on page 67
- "Configuring a Link Aggregation" on page 71
- "Configuring VLANs and VXLANs" on page 75
- "Removing the Driver" on page 81

▼ Analyze Why the Device Link Is Missing (Oracle Solaris)

When using the `ifconfig`(1M) or ipadm command and you see an error message similar to the sample below, perform these steps.

```
...
cannot open i40e0; link doesn't exist
...
```

1. **Check the OS.**

   Use the `ipadm`(1M) command to plumb the driver. Refer to the `ipadm`(1M) man page for instructions.

2. **Check that the adapter is seated properly in its slot, that the cables are properly attached, and that the LEDs are functioning.**

3. **Use the `prtconf`(1M) or `scanpci`(1M) command to ensure that the device is installed.**

4. **If the device exists, check the `/etc/driver_aliases` file to ensure that the file contains an `i40e` entry that corresponds to the name for the device.**

5. **If the entry exists, check the `/etc/path_to_inst` file to ensure that the file contains an `i40e` entry.**

   Removing a device and reseating it in another slot does not always clean up the device tree. If this is the case, you must remove the device tree and reboot the server. Refer to *Oracle Solaris Administration: Network Interfaces and Network Virtualization* for more information.

Related Information

- “Recover From a Port Hang (Oracle Solaris)” on page 86
- “Analyze Slow Network Performance (Oracle Solaris)” on page 87
- “Analyze Why the Link Is Not Up After Back-To-Back Cable Connection (Oracle Solaris)” on page 88
- “Analyze Why Changing the MTU Does Not Correctly Set the Link Property (Oracle Solaris)” on page 89

▼ Recover From a Port Hang (Oracle Solaris)

1. **Take one of these actions.**

   - If the interface encounters a soft hang, replumb the device.

     Use the `ipadm`(1M) command.
   - If the interface encounters a hard hang, reboot the server.
   - If the interface encounters another hard hang, try to capture the trace information by using the `dtrace`(1M) command, as in this example:

```
# detrace -F -m 'i40e{trace(timestamp)}'
>/tmp/dtrace.out
```

- If the server is panicked, retrieve the crash dump in `/var/crash`.
- If the interface encountered a hard hang or a panic, file a CR at My Oracle Support.

  Attach the last page of the `dtrace`(1M) output or the crash dump file to the CR.

2. **Check for the driver statistics.**

```
# kstat i40e:* :statistics
```

3. **Use the following parameters for performance tuning in `i40e.conf`:**

Parameters	Description
`rx_itr`	Interval of receive interrupts `0` to `4080`, `25` (`50` usec) by default .
tx_itr	Interval of transmit interrupts `0` to `4080`, `25` (`50` usec) by default.
`rx_limit_per_intr`	Maximum number of packet to receive per interrupt16 ~ 4096, 1024 by default.
`rx_copy_threshold`	Packet size to determine bcopy or not during receive0 ~ 9216, 128 by default.
`tx_copy_threshold`	Packet size to determine bcopy or not during transmit0 ~ 9216, 128 by default

Related Information

- “Analyze Why the Device Link Is Missing (Oracle Solaris)” on page 85
- “Analyze Slow Network Performance (Oracle Solaris)” on page 87
- “Analyze Why the Link Is Not Up After Back-To-Back Cable Connection (Oracle Solaris)” on page 88
- “Analyze Why Changing the MTU Does Not Correctly Set the Link Property (Oracle Solaris)” on page 89

▼ Analyze Slow Network Performance (Oracle Solaris)

The adapter supports several driver parameters that affect the performance of the ports. See “Driver Parameters (Oracle Solaris)” on page 63 for more information about the default values.

1. **View the network performance.**

```
# truss -p PID
```

2. **Look for NIS, DNS, and network routing outages.**

   If you find any issues, fix them before proceeding.

3. **View the I/O statistics to ensure that there are no bottlenecks on the disk.**

   ```
   # iostat -xcn 5
   ```

   If you discover a bottleneck, try setting logging to dump to the `/tmp` directory. Then, retest to ensure that the new configuration improved performance.

4. **Use the `vmstat`(1M) and the `mpstat`(1M) commands to check that none of these conditions exist:**

   - CPU is pegged.
   - CPU is receiving too many interrupts.
   - Memory is low.
   - Page faults are occurring.
   - Contention for resources causes too many spins on mutex (`smtx`).

   If the performance issue points to the driver, try to profile the call stack for `i40e`(7D) by using the `DTrace` script. For more information about the `DTrace` script, go to:

   `http://support.oracle.com`

Related Information

- “Analyze Why the Device Link Is Missing (Oracle Solaris)” on page 85
- “Recover From a Port Hang (Oracle Solaris)” on page 86
- “Analyze Why the Link Is Not Up After Back-To-Back Cable Connection (Oracle Solaris)” on page 88
- “Analyze Why Changing the MTU Does Not Correctly Set the Link Property (Oracle Solaris)” on page 89

▼ Analyze Why the Link Is Not Up After Back-To-Back Cable Connection (Oracle Solaris)

1. **Ensure that the correct cable type is being used.**

   See “Cable and Transceiver Descriptions” on page 39.

2. **Check that the switch ports have been configured to operate in the mode in which the adapter is running.**

Related Information

- “Analyze Why the Device Link Is Missing (Oracle Solaris)” on page 85
- “Recover From a Port Hang (Oracle Solaris)” on page 86
- “Analyze Slow Network Performance (Oracle Solaris)” on page 87
- “Analyze Why Changing the MTU Does Not Correctly Set the Link Property (Oracle Solaris)” on page 89

▼ Analyze Why Changing the MTU Does Not Correctly Set the Link Property (Oracle Solaris)

The `dladm` command might display this message:

```
# dladm: warning: cannot set link property 'mtu' on 'net0': link busy
```

It is possible that some objects defined on the link need to be removed or plumbed down.

- **Remove and retry the command.**

```
# dladm set-linkprop -p mtu=9706 net0
```

Related Information

- “Analyze Why the Device Link Is Missing (Oracle Solaris)” on page 85
- “Recover From a Port Hang (Oracle Solaris)” on page 86
- “Analyze Slow Network Performance (Oracle Solaris)” on page 87
- “Analyze Why the Link Is Not Up After Back-To-Back Cable Connection (Oracle Solaris)” on page 88

Glossary

A

ACT Activity LED. Indicates that the port is up and running.

B

BIOS Basic input/output system. In this guide, the term BIOS refers to the BIOS software on the client or server system.

C

CFI Canonical format indicator. A 1-bit field in the Ethernet header.

D

DHCP Dynamic Host Configuration Protocol. Part of the application layer in the Internet protocol suite.

DMA Direct memory access.

DNS Domain name system. Translates human-readable domain names into numerical identifiers.

DR Dynamic reconfiguration. Used to automatically reconfigure resources within a domain or from one domain to another domain.

E

EEE Energy-efficient Ethernet.

EEPROM Electronically erasable programmable read-only memory.

EMI Electromagnetic interference. The interference caused by the magnetic fields of electronic components.

G

Gb Gigabyte.

GbE Gigabit Ethernet.

Gbps Gigabits-per-second.

GT Gigabit-transfer.

GTps GTs-per-second.

I

IP Internet Protocol. The principal communications protocol in the IP suite.

K

KB Kilobytes.

L

LACP Link Aggregation Control Protocol. Enables several physical ports to be bundled into a single logical channel.

LAN Local area network. Two or more devices connected to each other either physically or logically.

LFM Linear feet per minute.

LNK Link LED. Indicates that the network link is up and running.

LOM LAN-on-motherboard. A LAN design.

low-profile adapter Refers to the Oracle Quad 10Gb Ethernet Adapter from Oracle.

M

MAC Media access control. Enables the use of a unique address for each device on a network.

Mb Megabit.

Mbps Megabits-per-second.

MPO Multi-Fiber Push-On connector.

MTP High performance MPO connector.

MTU Maximum transmission unit. The MTU (payload without the Ethernet header) affects how jumbo frames function.

N

NIC Network interface card. Connects clients and servers to a LAN, WAN, or VLAN.

NIS Network Information Service. Originally known as Yellow Pages, NIS is a protocol for distributed system configuration data.

NVM Nonvolitive memory.

P

PCI Peripheral Component Interconnect.

PCIe PCI Express.

PF Physical function.

PHY Physical layer. Controls the physical, analog signal access to a link.

PPA Physical point of attachment. Used in constructing VLAN IDs.

PXE Preboot execution environment. Enables clients to boot over a network interface, independent of the OS or other devices.

Q

QSFP Quad Small Form-factor Pluggable.

R

ROM Read-only memory.

RPM RPM Package Manager.

RSS Really Simple Syndication.

RX Response. The automatic response mechanism used by Ethernet PAUSE frames.

S

SerDes Serializer/deserializer. A mechanism used in high-speed connections to compensate for limited input or output.

SGMII Serial Gigabit Media Independent Interface. A standard interface used to connect an Ethernet MAC-block to a PHY.

SPI Serial peripheral interface. A type of flash memory.

SRC Source code. The SRC RPM is used in Linux to build the driver kernel files.

T

TCI Tag control information. Part of the Ethernet header.

TCP Transmission Control Protocol. Part of the transport layer of the Internet protocol suite.

TCP/IP Transmission Control Protocol and Internet Protocol. In this guide, TCP/IP refers to the TCP/IP model, which is a framework for the IP suite.

TPID Tag protocol identifier. Two bytes of information in an Ethernet frame.

TX Generation. The automatic generation mechanism used by the Ethernet PAUSE frames.

U

UDP User Datagram Protocol. Part of the transport layer of the Internet protocol suite.

UDP/IP User Datagram Protocol and Internet Protocol. In this guide, UDP/IP refers to the relationship between the two protocols, which are on different layers of the IP suite.

UEFI Unified Extensible Firmware Interface. Manages the operations between hardware firmware and the OS during the boot time.

V

VID VLAN identifier. A 12-bit identifier in an Ethernet header.

VLAN Virtual LAN. Splits the physical LAN into logical subparts. Multiple VLANs are supported on a single port, enabling a server with a single adapter to have a logical presence on multiple IP subnets.

VXLAN Virtual eXtensive LAN. A tunneling mechanism for providing isolated virtual Layer 2 (L2) segments that can span multiple physical L2 segments.

Index